780 CMR 56.00

WALL CONSTRUCTION

780 CMR 5601 GENERAL

5601.1 Application. The provisions of 780 CMR 56.00 shall control the design and construction of all walls and partitions for all buildings.

5601.2 Requirements. Wall construction shall be capable of accommodating all loads imposed according to 780 CMR 5301 and of transmitting the resulting loads to the supporting structural elements.

5601.2.1 Compressible Floor-covering Materials. Compressible floor-covering materials that compress more than $^{1}/_{32}$ inch (0.794 mm) when subjected to 50 pounds (23 kg) applied over one inch square (645 mm) of material and are greater than _ inch (3.2 mm) in thickness in the uncompressed state shall not extend beneath walls, partitions or columns, which are fastened to the floor.

780 CMR 5602 WOOD WALL FRAMING

5602.1 Identification. Load-bearing dimension lum-ber for studs, plates and headers shall be identified by a grade mark of a lumber grading or inspection agency that has been approved by an accreditation body that complies with DOC PS 20. In lieu of a grade mark, a certification of inspection issued by a lumber grading or inspection agency meeting the requirements of 780 CMR 5602 shall be accepted.

5602.1.1 End-jointed Lumber. Approved end-jointed lumber identified by a grade mark conforming to 780 CMR 5602.1 may be used interchangeably with solid-sawn members of the same species and grade.

5602.1.2 Structural Glued Laminated Timbers. Glued laminated timbers shall be manufactured and identified as required in AITC A190.1 and ASTM D3737.

5602.2 Grade. Studs shall be a minimum No. 3, standard or stud grade lumber.

Exception: Bearing studs not supporting floors and nonbearing studs may be utility grade lumber, provided the studs are spaced in accordance with 780 CMR Table 5602.3(5).

5602.3 Design and Construction. Exterior walls of wood-frame construction shall be designed and constructed in accordance with the provisions of 780 CMR 56.00 and 780 CMR Figures 5602.3(1) and 5602.3(2) or in accordance with AF&PA's NDS. Components of exterior walls shall be fastened in accordance with 780 CMR Table 5602.3(1) through 5602.3(4). Exterior walls covered with foam plastic sheathing shall be braced in accordance with 780 CMR 5602.10. Structural sheathing shall be fastened directly to structural framing members.

5602.3.1 Stud Size, Height and Spacing. The size, height and spacing of studs shall be in accordance with 780 CMR Table 5602.3.(5).

Exceptions:

1. Utility grade studs shall not be spaced more than 16 inches (406 mm) on center, shall not support more than a roof and ceiling, and shall not exceed eight feet (2438 mm) in height for exterior walls and load-bearing walls or ten feet (3048 mm) for interior nonload-bearing walls.
2. Studs more than ten feet (3048 mm) in height which are in accordance with 780 CMR Table 5602.3.1.

5602.3.2 Top Plate. Wood stud walls shall be capped with a double top plate installed to provide overlapping at corners and intersections with bearing partitions. End joints in top plates shall be offset at least 24 inches (610 mm). Plates shall be a nominal two inches in depth (51 mm) and have a width at least equal to the width of the studs.

Exception: A single top plate may be installed in stud walls, provided the plate is adequately tied at joints, corners and intersecting walls by a minimum three-inch-by-six-inch by a 0.036-inch-thick (76 mm by 152 mm by 0.9 14 mm) galvanized steel plate that is nailed to each wall or segment of wall by six 8d nails on each side, provided the rafters or joists are centered over the studs with a tolerance of no more than one inch (25.4 mm). The top plate may be omitted over lintels that are adequately tied to adjacent wall sections with steel plates or equivalent as previously described.

5602.3.3 Bearing Studs. Where joists, trusses or rafters are spaced more than 16 inches (406

mm) on center and the bearing studs below are spaced 24 inches (610 mm) on center, such members shall bear within five inches (127 mm) of the studs beneath.

Exceptions:

1. The top plates are two two-inch by six-inch (38 mm by 140 mm) or two three-inch by four-inch (64 mm by 89 mm) members.
2. A third top plate is installed.
3. Solid blocking equal in size to the studs is installed to reinforce the double top plate.

5602.3.4 Bottom (Sole) Plate. Studs shall have full bearing on a nominal two by (38 mm) or larger plate or sill having a width at least equal to the width of the studs.

780 CMR TABLE 5602.3(1)
FASTENER SCHEDULE FOR STRUCTURAL MEMBERS

DESCRIPTION OF BUILDING ELEMENTS	NUMBER AND TYPE OF FASTENER[a,b,c,d]	SPACING OF FASTENERS
Joist to sill or girder, toe nail	3-8d	—
1" x 6" subfloor or less to each joist, face nail	2-8d 2 staples, 1¾"	— —
2" subfloor to joist or girder, blind and face nail	2-16d	—
Sole plate to joist or blocking, face nail	16d	16" o.c.
Top or sole plate to stud, end nail	2-16d	—
Stud to sole plate, toe nail	3-8d or 2-16d	—
Double studs, face nail	10d	24" o.c.
Double top plates, face nail	10d	24" o.c.
Sole plate to joist or blocking at braced wall panels	3-16d	16" o.c.
Double top plates, minimum 24-inch offset of end joints, face nail in lapped area	8- 16d	—
Blocking between joists or rafters to top plate, toe nail	3-8d	—
Rim joist to top plate, toe nail	8d	6" o.c.
Top plates, laps at corners and intersections, face nail	2-10d	—
Built-up header, two pieces with ½" spacer	16d	16" o.c. along each edge
Continued header, two pieces	16d	16" o.c. along each edge
Ceiling joists to plate, toe nail	3-8d	—
Continuous header to stud, toe nail	4-8d	—
Ceiling joist, laps over partitions, face nail	3-10d	—
Ceiling joist to parallel rafters, face nail	3-10d	—
Rafter to plate, toe nail	2-16d	—
1" brace to each stud and plate, face nail	2-8d 2 staples, 1¾"	— —
1" x 6" sheathing to each bearing, face nail	2-8d 2 staples, 1¾"	— —
1" x 8" sheathing to each bearing, face nail	2-8d 3 staples, 1¾"	— —
Wider than 1" x 8" sheathing to each bearing, face nail	3-8d 4 staples, 1¾"	— —
Built-up corner studs	10d	24" o.c.
Built-up girders and beams, 2-inch lumber layers	10d	Nail each layer as follows: 32" o.c. at top and bottom and staggered. Two nails at ends and at each splice.
2" planks	2-16d	At each bearing
Roof rafters to ridge, valley or hip rafters: toe nail face nail	4-16d 3-16d	— —
Rafter ties to rafters, face	3-8d	—

780 CMR TABLE 5602.3(1) - continued
FASTENER SCHEDULE FOR STRUCTURAL MEMBERS

DESCRIPTION OF BUILDINGMATERIALS	DESCRIPTION OF FASTENER[b,c,d,e]	SPACING OF FASTENERS	
		Edges (inches)[i]	Intermediate supports[c,e] (inches)
Wood structural panels, subfloor, roof and wall sheathing to framing, and particleboard wall sheathing to framing			
5/16 " - ½"	6d common nail (subfloor, wall) 8d common nail (roof)[f]	6	12[g]
19/32 " - 1 "	8d common nail	6	12[g]
1_" - 1¼"	10d common nail or 8d deformed nail	6	12
Other wall sheathing[h]			
½" regular cellulosic fiberboard sheathing	1 " galvanized roofing nail 6d common nail staple16 ga., 1½ long	3	6
½" structural cellulosic fiberboard sheathing	1½" galvanized roofing nail 8d common nail staple16 ga., 1½ long	3	6
25/32 " structural cellulosic fiberboard sheathing	1¾ galvanized roofing nail 8d common nail staple16 ga., 1¾ long	3	6
½" gypsum sheathing	1½" galvanized roofing nail; 6d common nail; staple galvanized, 1½ long; 1¼ screws, Type W or S	4	8
_" gypsum sheathing	1¾" galvanized roofing nail; 8d common nail; staple galvanized, 1_" long; 1_" screws, Type W or S	4	8
Wood structural panels, combination subfloor underlayment to framing			
¾" and less	6d deformed nail or 8d common nail	6	12
_" - 1 "	8d common nail or 8d deformed nail	6	12
1_" - 1¼"	10d common nail or 8d deformed nail	6	12

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 mile per hour = 1.609 km/h.

a. All nails are smooth-common, box or deformed shanks except where otherwise stated. Nails used for framing and sheathing connections shall have minimum average bending yield strengths as shown: 80 ksi (551 MPa) for shank diameter of 0.192 inch (20d common nail), 90 ksi (620 MPa) for shank diameters larger than 0.142 inch but not larger than 0.177 inch, and 100 ksi (689 MPa) for shank diameters of 0.142 inch or less.
b. Staples are 16 gage wire and have a minimum 7/16-inch on diameter crown width.
c. Nails shall be spaced at not more than six inches on center at all supports where spans are 48 inches or greater.
d. Four-foot-by-eight-foot or four-foot-by-nine-foot panels shall be applied vertically.
e. Spacing of fasteners not included in this table shall be based on 780 CMR Table 5602.3(2).
f. For regions having basic wind speed of 110 mph or greater, 8d deformed nails shall be used for attaching plywood and wood structural panel roof sheathing to framing within minimum 48-inch distance from gable end walls, if mean roof height is more than 25 feet, up to 35 feet maximum.
g. For regions having basic wind speed of 100 mph or less, nails for attaching wood structural panel roof sheathing to gable end wall framing shall be spaced six inches on center. When basic wind speed is greater than 100 mph, nails for attaching panel roof sheathing to intermediate supports shall be spaced six inches on center for minimum 48-inch distance from ridges, eaves and gable end walls; and four inches on center to gable end wall framing.
h. Gypsum sheathing shall conform to ASTM C 79 and shall be installed in accordance with GA 253. Fiberboard sheathing shall conform to either AHA 194.1 or ASTM C 208.
i. Spacing of fasteners on floor sheathing panel edges applies to panel edges supported by framing members and at all floor perimeters only. Spacing of fasteners on roof sheathing panel edges applies to panel edges supported by framing members and at all roof plane perimeters. Blocking of roof or floor sheathing panel edges perpendicular to the framing members shall not be required except at intersection of adjacent roof planes. Floor and roof perimeter shall be supported by framing members or solid blocking.

780 CMR TABLE 5602.3(2)
ALTERNATE ATTACHMENTS

NOMINAL MATERIAL THICKNESS (inches)	DESCRIPTION[a,b] OF FASTENER AND LENGTH (inches)	SPACING[c] OF FASTENERS	
		Edges (inches)	Intermediate supports (inches)
Wood structural panels subfloor, roof and wall sheathing to framing and particleboard wall sheathing to framing[f]			
$^{5}/_{16}$	0.097 - 0.099 Nail 1½ Staple 15 ga. 1_ Staple 16 ga. 1¾	6	12
	Staple 15 ga. 1_	6	12
	0.097 - 0.099 Nail 1½	4	10
_	Staple 16 ga. 1¾	6	12
	Staple 15 ga. 1½	6	12
	0.097 - 0.099 Nail 1_	3	6
$^{15}/_{32}$ and ½	Staple 16 ga. 1¾	6	12
	0.113 Nail 1_ Staple 15 and 16 ga. 1_	6	12
$^{19}/_{32}$ and _	0.097 - 0.099 Nail 1¾	3	6
	Staple 14 ga. 1¾	6	12
	Staple 15 ga. 1¾	5	10
	0.097 - 0.099 Nail 1_	3	6
$^{23}/_{32}$ and ¾	Staple 16 ga. 2	4	8
	Staple 14 ga. 2	5	10
	0.113 Nail 2¼, Staple 15 ga. 2	4	8
1	0.097 - 0.099 Nail 2_	3	6
NOMINAL MATERIAL THICKNESS (inches)	DESCRIPTION[a,b] OF FASTENER AND LENGTH (inches)	SPACING[c] OF FASTENERS	
		Edges (inches)	Body of panel[d](inches)
Floor underlayment; plywood-hardboard-particleboard[f]			
Plywood			
¼ and $^{5}/_{16}$	1¼ ring or screw shank nail—minimum 12½ ga. (0.099^) shank diameter	3	6
	Staple 18 ga., _, $^{3}/_{16}$ crown width	2	5
$^{11}/_{32}$, _, $^{15}/_{32}$ and ½	1¼ ring or screw shank nail—minimum12½ ga. (0.099) shank diameter	6	8[e]
$^{19}/_{32}$, _, $^{23}/_{32}$ and ¾	1½ ring or screw shank nail—minimum 12½ ga. (0.099) shank diameter	6	12
	Staple 16 ga. 1¼	6	8
Hardboard[f]			
	1½ long ring-grooved underlayment nail	6	6
	4d cement-coated sinker nail	6	6
0.200	Staple 18 ga.,_ long (plastic coated)	3	6
Particleboard			
	4d ring-grooved underlayment nail	3	6
¼	Staple 18 ga., _ long, $^{3}/_{16}$ crown	3	6
	6d ring-grooved underlayment nail	6	10
_	Staple 16 ga., 1_ long, _ crown	3	6
	6d ring-grooved underlayment nail	6	10
½, _	Staple 16 ga., 1_ long, _ crown	3	6

For SI: 1 inch = 25.4 mm.

a. Nail is a general description and may be T-head, modified round head or round head.
b. Staples shall have a minimum crown width of $^{7}/_{16}$-inch on diameter except as noted.
c. Nails or staples shall be spaced at not more than six inches on center at all supports where spans are 48 inches or greater. Nails or staples shall be spaced at not more than 12 inches on center at intermediate supports for floors.
d. Fasteners shall be placed in a grid pattern throughout the body of the panel.
e. For 5-ply panels, intermediate nails shall be spaced not more than 12 inches on center each way.
f. Hardboard underlayment shall conform to ANSI/AHA A135.4.

780 CMR TABLE 5602.3(3)
ALLOWABLE STUD SPACING FOR WOOD STRUCTURAL PANEL WALL SHEATHING

PANEL SPAN RATING	PANEL NOMINAL THICKNESS (inch)	MAXIMUM STUD SPACING (inches) Siding nailed to:[a] Stud	Sheathing
12/0, 16/0, 20/0, or wall —16 o.c.	$^{5}/_{16}$, _	16	16[b]
24/0, 24/16, 32/16 or wall—24 o.c.	_, $^{7}/_{16}$, $^{15}/_{32}$, ½	24	24[c]

For SI: 1 inch = 25.4 mm.
a. Blocking of horizontal joints shall not be required.
b. Plywood sheathing $^{3}/_{8}$-inch thick or less shall be applied with long dimension across studs.
c. Three-ply plywood panels shall be applied with long dimension across studs.

780 CMR TABLE 5602.3(4)
ALLOWABLE SPANS FOR PARTICLEBOARD WALL SHEATHING[a]

THICKNESS (inch)	GRADE	STUD SPACING (inches) When siding is nailed to studs	When siding is nailed to sheathing
_	M-1 Exterior glue	16	—
½	M-2 Exterior glue	16	16

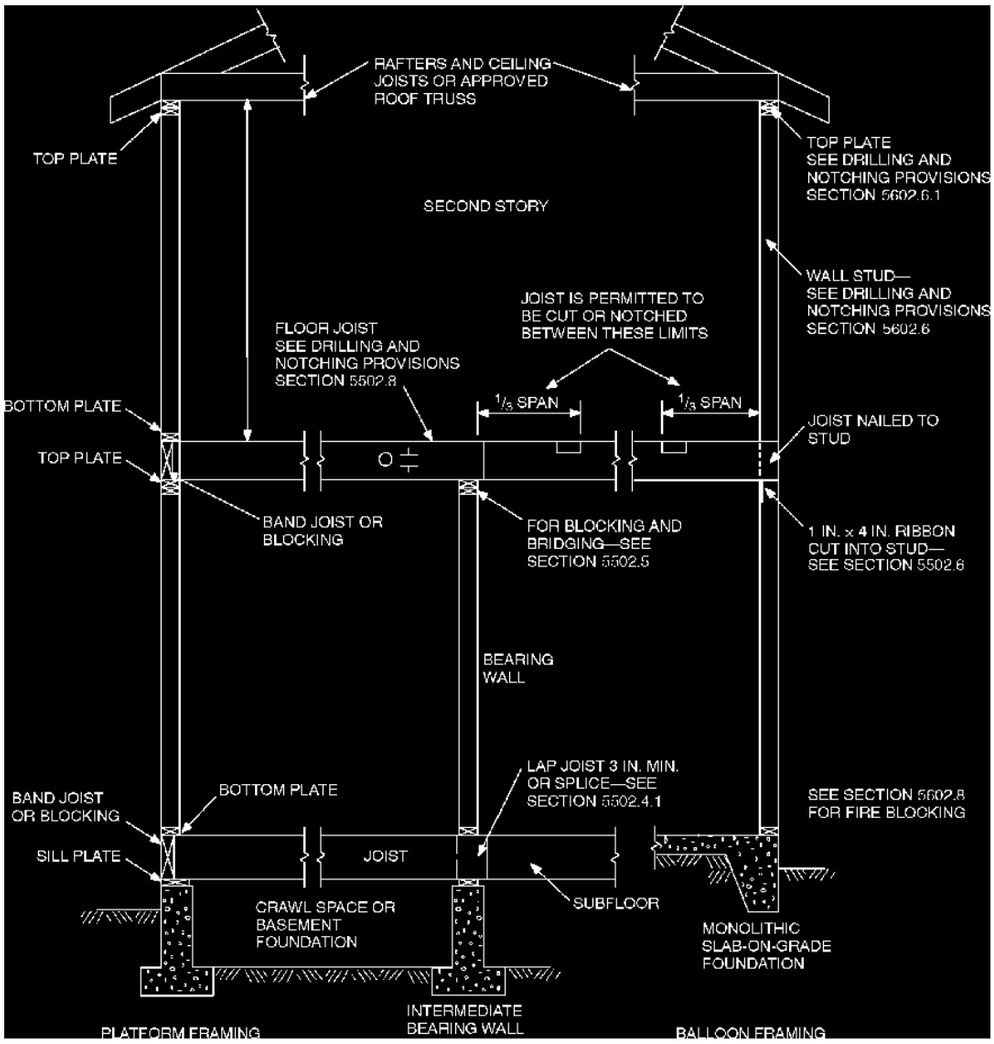
For SI: 1 inch = 25.4 mm.
a. Wall sheathing not exposed to the weather. If the panels are applied horizontally, the end joints of the panel shall be offset so that four panels corners will not meet. All panel edges must be supported. Leave a $^{1}/_{16}$-inch gap between panels and nail no closer than _ inch from panel edges.

780 CMR TABLE 5602.3(5)
SIZE, HEIGHT AND SPACING OF WOOD STUDS[a]

STUD SIZE (inches)	BEARING WALLS Laterally unsupported stud height[a] (feet)	Maximum spacing when supporting roof and ceiling only (inches)	Maximum spacing when supporting one floor, roof and ceiling (inches)	Maximum spacing when supporting two floors, roof and ceiling (inches)	Maximum spacing when supporting one floor only (inches)	NONBEARING WALLS Laterally unsupported stud height[a] (feet)	Maximum spacing (inches)
2× 3[b]	—	—	—	—	—	10	16
2× 4	10	24	16	—	24	14	24
3× 4	10	24	24	16	24	14	24
2× 5	10	24	24	—	24	16	24
2× 6	10	24	24	16	24	20	24

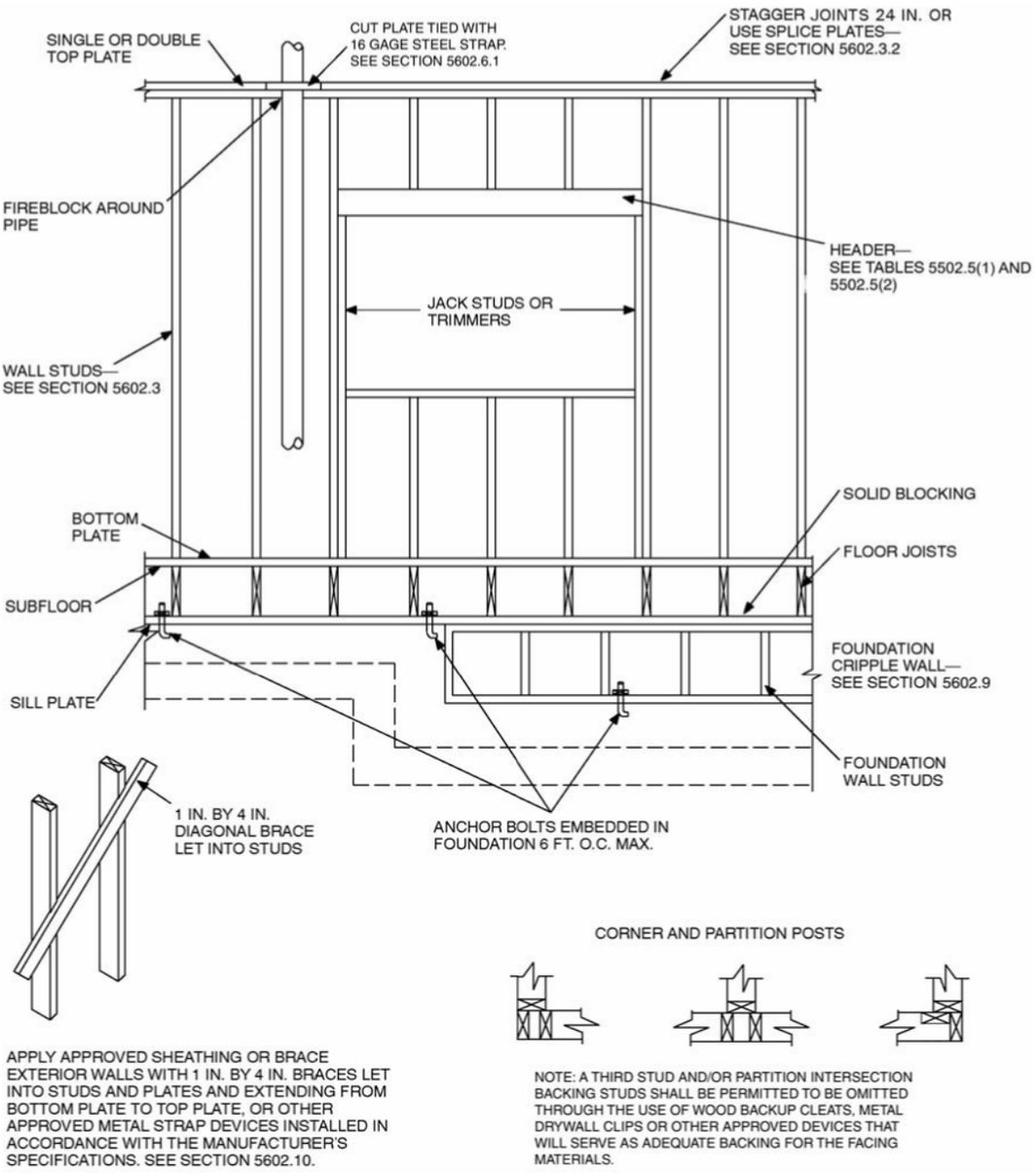
For SI: 1 inch = 25.4 mm.
a. Listed heights are distances between points of lateral support placed perpendicular to the plane of the wall. Increases in unsupported height are permitted where justified by analysis.
b. Shall not be used in exterior walls.

780 CMR FIGURE 5602.3(1)
TYPICAL WALL, FLOOR AND ROOF FRAMING



For SI: 1 inch = 25.4 mm.

780 CMR FIGURE 5602.3(2)
FRAMING DETAILS



For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm.

780 CMR TABLE 5602.3.1
MAXIMUM ALLOWABLE LENGTH OF WOOD WALL STUDS EXPOSED TO WIND SPEEDS OF 100 MPH OR LESS IN SEISMIC DESIGN CATEGORIES A, B, C and D_1[b,c]

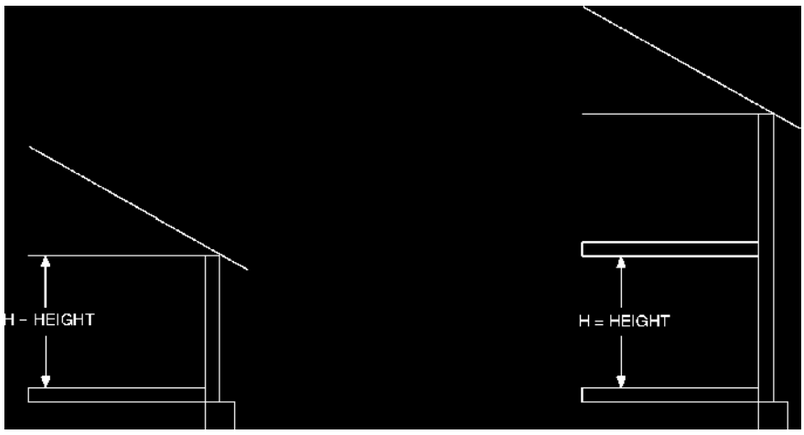
HEIGHT (feet)	ON-CENTER SPACING (inches)			
	24	16	12	8
Supporting a roof only				
>10	2 × 4	2 × 4	2 × 4	2 × 4
12	2 × 6	2 × 4	2 × 4	2 × 4
14	2 × 6	2 × 6	2 × 6	2 × 4
16	2 × 6	2 × 6	2 × 6	2 × 4
18	NA[a]	2 × 6	2 × 6	2 × 6
20	NA[a]	NA[a]	2 × 6	2 × 6
24	NA[a]	NA[a]	NA[a]	2 × 6
Supporting one floor and a roof				
>10	2 × 6	2 × 4	2 × 4	2 × 4
12	2 × 6	2 × 6	2 × 6	2 × 4
14	2 × 6	2 × 6	2 × 6	2 × 6
16	NA[a]	2 × 6	2 × 6	2 × 6
18	NA[a]	2 × 6	2 × 6	2 × 6
20	NA[a]	NA[a]	2 × 6	2 × 6
24	NA[a]	NA[a]	NA[a]	2 × 6
Supporting two floors and a roof				
>10	2 × 6	2 × 6	2 × 4	2 × 4
12	2 × 6	2 × 6	2 × 6	2 × 6
14	2 × 6	2 × 6	2 × 6	2 × 6
16	NA[a]	NA[a]	2 × 6	2 × 6
18	NA[a]	NA[a]	2 × 6	2 × 6
20	NA[a]	NA[a]	NA[a]	2 × 6
22	NA[a]	NA[a]	NA[a]	NA[a]
24	NA[a]	NA[a]	NA[a]	NA[a]

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479kN/m^2, 1 pound per square inch = 6.895 kPa, 1 mile per hour = 1.609 km/h.

a. Design required.

b. Applicability of this table assumes the following: Snow load not exceeding 25 psf, f_b not less than 1310 psi determined by multiplying the AF&PA NDS tabular base design value by the repetitive use factor, and by the size factor for all species except southern pine, E not less than 1.6 by 10^6 psi, tributary dimensions for floors and roofs not exceeding six feet, maximum span for floors and roof not exceeding 12 feet, eaves not greater than two feet in dimension and exterior sheathing. Where the conditions are not within these parameters, design is required.

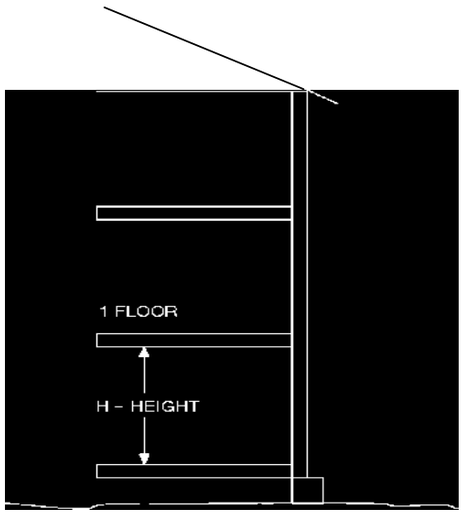
c. Utility, standard, stud and No. 3 grade lumber of any species are not permitted.



1 ROOF LOAD

1 ROOF LOAD
1 FLOOR LOAD

780 CMR TABLE 5602.3.1—continuedMAXIMUM ALLOWABLE LENGTH OF WOOD WALL STUDS EXPOSED TO WIND SPEEDS OF 100 MPH OR LESS IN SEISMIC DESIGN CATEGORIES A, B, C and D_1



1 ROOF LOAD
2 FLOOR LOADS

5602.4 Interior Load-bearing Walls. Interior load-bearing walls shall be constructed, framed and fireblocked as specified for exterior walls.

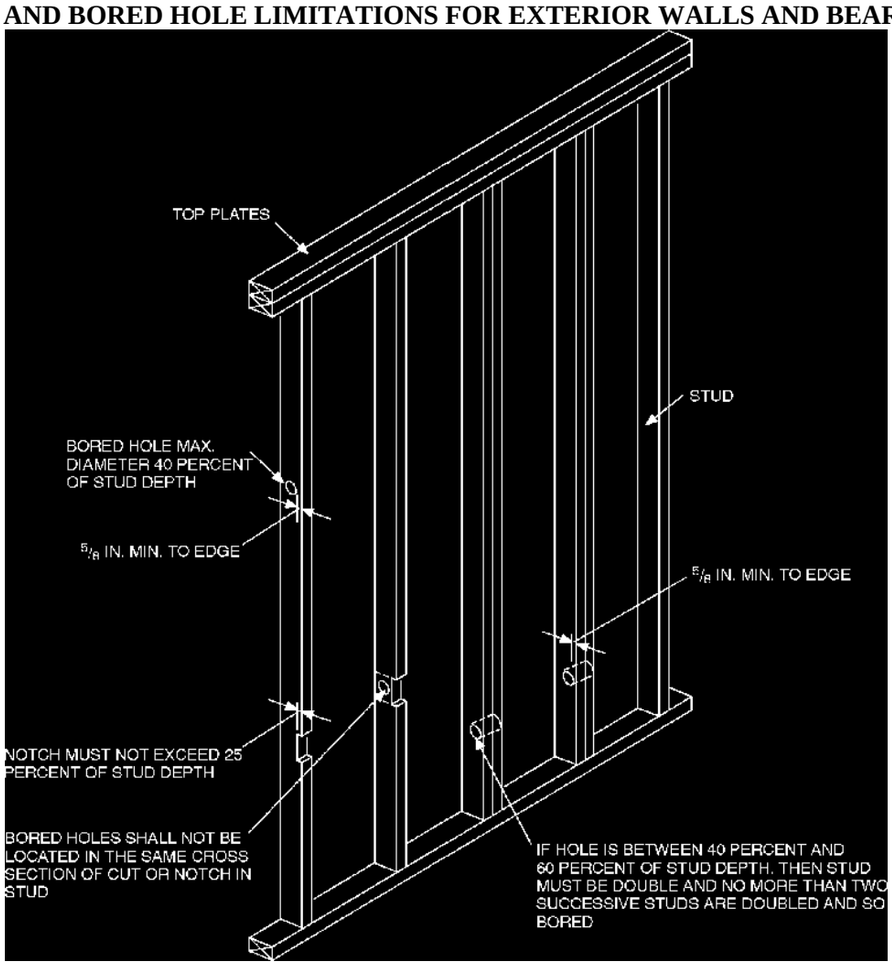
5602.5 Interior Nonbearing Walls. Interior nonbearing walls shall be permitted to be constructed with two-inch-by-three-inch (51 mm by 76 mm) studs spaced 24 inches (610 mm) on center or, when not part of a braced wall line, two-inch-by-four-inch (51 mm by 102 mm) flat studs spaced at 16 inches (406 mm) on center. Interior nonbearing walls shall be capped with at least a single top plate. Interior nonbearing walls shall be fireblocked in accordance with 780 CMR 5602.8.

5602.6 Drilling and Notching—Studs. Any stud in an exterior wall or bearing partition may be cut or notched to a depth not exceeding 25% of its width. Studs in nonbearing partitions may be notched to a depth not to exceed 40% of a single stud width. Any stud may be bored or drilled, provided that the diameter of the resulting hole is no greater than 40% of the stud width, the edge of the hole is no closer than _ inch (15.9 mm) to the edge of the stud, and the hole is not located in the same section as a cut or notch. *See* 780 CMR Figures 5602.6(1) and 5602.6(2).

Exceptions:

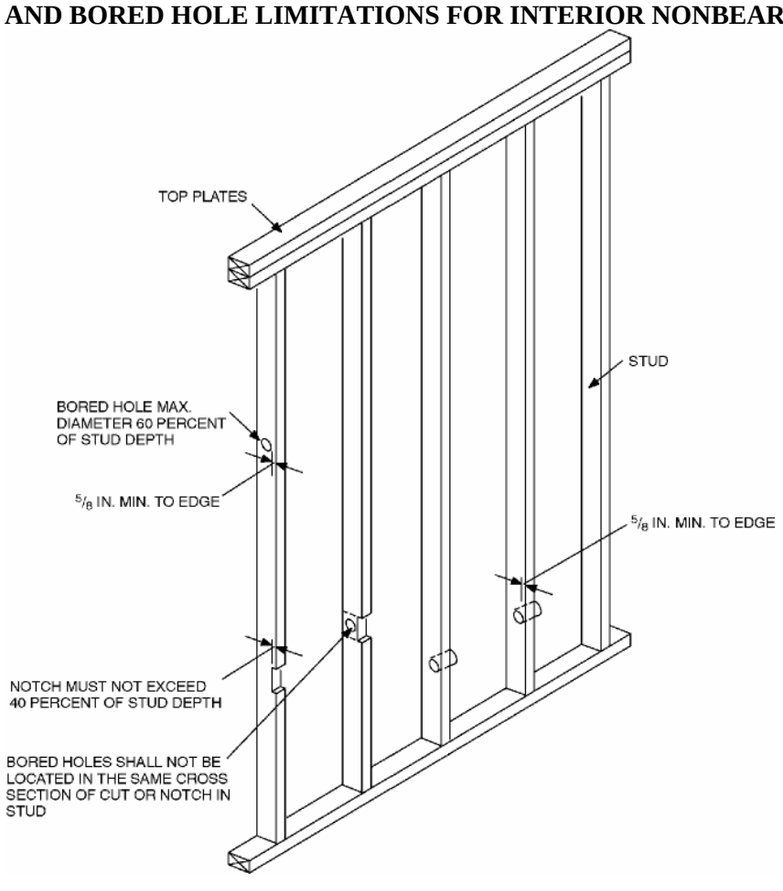
1. A stud may be bored to a diameter not exceeding 60% of its width, provided that such studs located in exterior walls or bearing partitions are doubled and that not more than two successive studs are bored.
2. Approved stud shoes may be used when installed in accordance with the manufacturer’s recommendation.

780 CMR FIGURE 5602.6(1)
NOTCHING AND BORED HOLE LIMITATIONS FOR EXTERIOR WALLS AND BEARING WALLS



For SI: 1 inch = 25.4 mm.
NOTE: Condition for exterior and bearing walls.

780 CMR FIGURE 5602.6(2)
NOTCHING AND BORED HOLE LIMITATIONS FOR INTERIOR NONBEARING WALLS



For SI: 1 inch = 25.4 mm.